Security document having a contactless chip with data masking

The present invention relates to a security document having a contactless chip with data masking.

Increasingly, security documents of the identity document type (passports, identity cards, etc), include an electronic circuit with contactless reading. The electronic circuit comprises an electronic module, or chip, connected to an inductive or capacitive antenna. This type of device can be used, for example, to store in digital form personal data concerning civil status and biometric data as well as administrative data. When the security document must be checked to verify its validity, for example, the stored data is read by a receiving device, or reader, via a remote electronic coupling between the electronic circuit of the card, otherwise called transponder, and the reader. The use of contactless technologies provides significant advantages in lifetime and ergonomic terms. However, it is important to assure the citizen that his identity document cannot be read without his knowledge. In practice, the contactless technology will be all the more accepted when the authorization to read data stored in the document remains under the control of the document holder.

The object of the present invention is to restore the deliberate action on the part of the citizen to allow access to the data contained in a security document having a contactless chip. For this, the security document comprises a masking element, which is passive, designed to disturb the operation of the contactless coupling mechanism as long as the document-holder has not carried out this deliberate action to allow access to the document.

More specifically, the invention proposes a security document having a contactless chip comprising a transponder comprising an electronic module connected to an antenna placed on a given surface of a first part of the document, said transponder being designed to communicate remotely via an electromagnetic coupling with a reader, characterized in that the security document also comprises a passive masking element of said antenna, supported by a second part of the document, which can move relative to said first part, said masking element being capable of disturbing the coupling

between the transponder and the reader for rendering the reading of the document impossible when said second part is in a predetermined position, that corresponds to a closed position of the document.

The use of a passive element for masking the antenna also allows for a particularly simple and inexpensive implementation.

Other advantages and characteristics will become more clearly apparent from reading the description that follows, illustrated by the appended figures which represent:

- figures 1A, 1B, 1C, electronic diagrams illustrating the principle of communication between the transponder of a contactless chip document and a reader;
- figure 2, an exemplary embodiment of a security document according to the invention, of passport type;
- figure 3, an exemplary embodiment of a security document according to the invention, of card type with protective case.

In these figures, like elements are referenced by the same identifiers.

Figures 1A to 1C illustrate the principle of communication between the transponder 10 of a security document having a contactless chip and a reader 11, the transponder and the reader being represented by equivalent electrical diagrams.

The transponder 10 conventionally comprises an antenna, in this example an inductive antenna 101, for example in coiled wire form, or implemented by conductive ink screen printing or by etching a layer of copper, for example, connected to an electronic module, or chip 102. The communication with the reader 11 is conducted via a remote electromagnetic coupling. This coupling is set up in read mode or in read/write mode and the data is transmitted by radio or microwave frequencies. Figure 1A illustrates the communication of the data from the transponder to the reader. Conventionally, the electric current passing through the antenna 111 of the reader fed by a circuit 112 causes the appearance of a magnetic flux. At a distance d, the instantaneous variation of this magnetic flux generates the appearance of a potential difference Ut induced at the terminals of the conductive element that is formed by the antenna 101 of the transponder, so enabling remote power feed to the electronic module 102 to which the

antenna 101 is connected. After the transponder has been tuned to the carrier frequency of the reader, the order of magnitude of the voltage that can be used is typically a few volts. When the reader wants to have input data available in the transponder, it supplies the latter with a non-modulated carrier, so that it is still remote power-fed. According to a widely used transmission mode, the transponder digitally modulates the equivalent resistive load that it represents. By doing this, it modifies the energy consumption that it represents in the magnetic field and, because of the magnetic coupling existing between the transponder and the reader, tends to modify the value of the current $I\ell$ circulating in the circuit of the antenna 111 of the reader. A demodulator 113 allows a part of the voltage $U\ell$ at the terminals of the antenna 111 to recover the output data. Figures 1B and 1C show, as a function of time, respectively the trend of the voltage Ut at the terminals of the antenna 101 modulated as a function of the input data and the potential difference $U\ell$ resulting from it at the terminals of the antenna 111 of the reader, and the trend of the output signal after demodulation.

The quality and quantity of the energy transfer depend on the frequencies to which the two antenna circuits are tuned. For example, the frequency 13.56 MHz is widely used.

The devices that use contactless chips, such as cards having contactless chips or other security documents, present major advantages in ergonomic and lifetime terms and are bound to be developed. A wide body of literature exists in this field and the implementation methods are well known from the state of the art (see, for example, patent application FR 2787609 on a method of fabricating cards having contactless chips).

However, when the security documents contain personal information such as civil status and biometric data, like a passport or an identity card for example, the document-holder may be entitled to ensure that this data will not be able to be read without his knowledge.

The invention proposes a security document with data masking enabling the document-holder to restore the deliberate action to allow the reading of the documents.

Figures 2 and 3 illustrate two nonlimiting examples of this. The first example is that of a passport type book 20, comprising two covers, front and

back (21, 22), and a set of movable sheets 23. The second example is that of a card protected by a case (30).

According to the invention, the security document having a contactless chip comprises a transponder comprised of an electronic module 102 connected to an antenna 101. The antenna, conventionally in the form of a wound wire, is placed on a given surface of a first part of the document, for example one of the covers 22 of the book 20. The transponder is designed to communicate remotely via an electromagnetic coupling with a reader, not shown in figure 2. According to the invention, the security document also comprises a passive masking element 24 of the antenna, supported by a second part of the document (the cover 21 of the book in the example of figure 2), this second part being able to be moved relative to the first part. The masking element is a passive element, capable of disturbing the coupling between the transponder and the reader for rendering the reading of the document impossible when said second part is in a predetermined position that corresponds to a closed position of the document. Thus, in the example of figure 2, the masking element is chosen to make the reading impossible when the book is closed.

The passive masking element can be comprised of any material capable of disturbing the coupling, for example a metallic material or a magnetic material, in a manner sufficient to prevent reading. In practice, since the quality and the quantity of the energy transfer between the reader and the transponder depend on the frequencies to which the two antenna circuits are tuned, the coupling coefficient and the quality factors of the tuned circuits of the reader and the transponder, any electrical or magnetic disturbance of the antenna circuit of the transponder will result in a disturbance of the coupling.

The applicant has thus demonstrated that, with a passive masking element comprising a thin metallic layer of a given form, arranged in such a way that, when the document is in the closed position, said layer is facing the surface area covered by the antenna, the coupling diminishes very strongly to the point that the document is protected from any unwanted reading. The applicant has even observed that it was not necessary for all of the surface area covered by the antenna to be facing the metallic film. Thus, very good results have been obtained with a thin metallic layer of a form that is such

that, when the document is in the closed position, the layer is facing the peripheral area of the surface area covered by the antenna, or at least a large part of this area. Thus, in the example of figure 2, the passive masking element 24 is comprised of a thin metallic layer, the form of which is roughly that of a box which, when the book is closed, is facing the peripheral area of the antenna 101 of the transponder.

According to a variant, the thin layer is formed from a sheet of metallic material, for example a sheet of aluminum. The thin layer can also be formed by means of a screen printed conductive paste on the part of the document intended to receive it, in this example the cover 21 of the book.

The applicant has observed in the exemplary embodiment of figure 2 that the results of masking the antenna were independent of the relative position of the reader in relation to the masking element. Thus, the reading of the document is disabled in the same way when the document is closed and when an attempt is made to read it by bringing the reader near the side of the cover 21 which supports the masking element or the side of the cover 22 which supports the transponder. Because of this, in the case of the book, the passive masking element can be supported immaterially by one of the covers, or one of the sheets, the only constraint being that it should be borne by an element of the book separate from that supporting the transponder.

Moreover, the thin metallic layer can be directly supported by the part of the document intended to receive it or formed on a support that will, for example, be glued to said part of the document. Thus, it is, for example, possible to glue onto a cover or a sheet of existing passports, a label on which is screen printed the masking element, so simply and inexpensively enabling protection against unwanted reading of existing security documents.

Figure 3 represents another example of a security document having a contactless chip equipped with a masking element according to the invention. In this example, the document 30 is comprised of a card 31, for example an identity card, and a protective case 32. The antenna 101 of the transponder is supported by the card and the passive masking element 24 is supported by the case, such that the reading of the card is made impossible when the latter is stored in the case. For example, the case 32 comprises two flaps 321, 322, folded one over the other, a first flap 321 with a recess 323,

for example made of plastic, in which the card is intended to be inserted, the second flap 322 supporting the passive masking element, in such a way that the reading of the card is made impossible when the flaps of the case are folded one over the other.

Of course, these exemplary embodiments are by no means limiting.

The use of a lossy magnetic material (and not a permanent magnet) is also possible to produce the passive masking element. This may be, for example, ferrite composites, in sheet form or deposited by printing on the second part of the security document, able to move in relation to the first part supporting the transponder.